The Journal of The Madras Geographical Association

Vol. 9 April 1934 No. 1

Venkatadhwari's Account of India

A meeting of the Association was held at 5-30 P.M. on Friday the 23rd March 1934 at the University Department of Geography, Wesley College, Royapettah, when **Mr. C. Sivaramamurthy,** B.A. (Hons.), University Research student in Sanskrit, read a paper on **"Venkatadhwari's Account of India."**

M.R.Ry. Diwan Bahadur K. S. Ramaswami Sastri Avl., B.A., B.L., Retired District and Sessions Judge, who presided on the occasion, introduced the lecturer as a talented young artist who interpreted Sanskrit literature through creative art.

(The following paper was then read and discussed.)

A rambling propensity is not an uncommon trait with an inquisitive person; and a traveller it is who is generally the distributor of a particular kind of knowledge— a sympathetic study of the world and its inmates—highly instructive without the irksome office of burning the midnight oil. Topics of travel and adventure are prone to kindle the imagination of ramblers and egg them on to further trudging. The halo of mysterious piety enlacing places deemed divine attracts the steady gaze of many a pilgrim religiously disposed. Not very rarely it happens that the pilgrim is profusely gifted by the poetic muse and pours forth in elegant verse a record of his peregrinations ablaze with fiery detail and throbbing with personal moralisings.

A student of Venkatadhwari cannot be blind to this aspect in his work which is but an account of the poet's own travels described as that of a couple of Gandharvas[1] who

1. Visvagunadarsa (Nirnayasagar Edn.), p. 4, sl. 5.

"Placed on high above the storm's career,
Look downward where a hundred realms appear;
Lakes, forests, cities, plains extending wide,
The pomp of Kings, the shepherd's humbler guide."

Representing two distinctly different types of humanity, Krisanu adheres to that party of men who answer in the affirmative to the question:

"When thus creation's charms around combine,
Amidst the store should thankless Pride repine,"

Visvavasu representing the class:

"Wiser he whose sympathetic mind
Exults in all the good of all mankind."[2]

The poet though professing to give out a detailed description of the world does not touch on a single spot outside India; and even in giving an account of places within that land his idea of territory beyond his familiar area happens to be vague and indistinct. But then religious anecdotes and his mastery of the languages carry him a great way and he escapes to a great extent the scrutinizing eye of the critic who might question why he attempts those descriptions with an insufficiency of material. All idea of distance and travel are set at naught in his description of the northern Indian tour. The aerial car flies hither and thither helter-skelter. Coming to South India, there is a smooth and methodical course adopted. The date of the poet being the 17th century the description of India that he gives is of that period.

The first of a list, a place of which the poet has only a superficial knowledge is Badarikasrama. Here Lord Vishnu is believed to stay with the sole intention of helping his devotees.[3] In the impudent sarcasm of Krisanu we find a true description of the cold breezes of the Himalayas on whose monster ice-heaps is situated this sacred spot; no wonder the pilgrims quail at the idea of a holy bath in such a chilling atmosphere.[4] Badarikasrama is the same as Modern Badrinath, "a place of the main Himalaya range in Garhwal

2. Visvagunadarsa, p. 4, sl. 6.
3. Ibid., p. 29, sl. 33.
4. Ibid., p. 30, sl. 34.

district, reaching to the height of 23,210 feet above the sea. From the glaciers on its sides, the Alakananda river and many of its tributaries take their rise. On one of its shoulders, at an elevation of 10,400 feet, and 56 miles north-east of Srinagar, stands a shrine of Vishnu, which also bears the name of Badrinath. The existing temple is more noteworthy for its religious importance than for any architectural pretensions.

Below the shrine a sacred tank stands on the hill-side, supplied from a thermal spring by means of a spout in the shape of a dragon's* head. Pilgrims of both sexes bathe in the holy pool.[5]

The next is Ayodhya on the banks of Sarayu.[6] The yupastambhas on the river side are only the poet's fancy and the information that we get here is nothing new. This ancient town and railway station is 4 miles from Fyzabad and situated on the right bank of the Gogra or Sarju river.[7]

Not very far off is the sacred river Ganges, whose mythical origin from Vishnu's feet and descent from Siva's locks forms a suitable subject for the poet's description.[8] Her confluence with Saraswati and Yamuna is also referred to.[9] On the banks of the river is situated the famous city of Varanasi or Benares, abounding in majestic mansions.[10] The people of this place are pictured as very rich and affluent ever riding excellent horses and elephants.[11] Visvavasu's appreciation of the good features of the place kindles the criticising spirit of Krisanu, who straightaway begins to give out a catalogue of its defects. This gives us an insight into the life of that city about that particular period. The poet confesses indirectly, through the mouth of Krisanu, his disapproval of the people of the place who after bathing in the sacred streams wear clothes brought by washerman, wander about in the streets, touch mlecchas (Europeans or Muslims), take meal even without taking a bath

* Makara.

5. The Indian Companion—Badrinath.
6. Visvagunadarsa, p. 32, sl. 36.
7. The Indian Companion—Ajodhya.
8. Visvagunadarsa, p. 51, sl. 76.
9. Ibid., p. 53, sl. 80.
10. Ibid., p. 54, sl. 82.
11. Ibid., p. 55, sl. 83.

again and with all not a blush creeping to their cheeks ![12] His orthodox sentiment is wounded when he sees Sastras neglected and the military profession resorted to, when water brought by Sudras serves for bathing, drinking and worship ! When intercourse with all sorts of people and walking close to a Chandala in the streets is considered no folly ![13] He can't but wonder at the curious nature of a people who partake of food come under the purview of Mlecchas and dogs in the company of low and vile men ignorant of even a syllable of the Veda.[14]

The author is further disgusted with the people of that place who in their eagerness for wealth go away on travel wasting their prime of life in trading abroad, thus spoiling the youth of their lovely wives only to return home with grey hairs on their head.[15]

Now comes Visvavasu rebuking his friend for his criticising attitude and shows him that resorting to the military profession and following the Mussalman kings is no sin in the case of these amiable men who do all this only to protect the 'temples of their gods.'[16] Here through the mouth of Visvavasu the poet voices forth his appreciation of the good element even in people opposed to orthodoxy and thus reveals his tolerant spirit. In the appreciative speech of Visvavasu there are two interesting facts. The poet feels gratified that the people of the place avoid eating paryusita (cooked rice of the previous day preserved in water) as is the custom in the south, and cook and dine only in a place well smeared with cowdung.[17]

After an almost Pauranic description of the ocean Jagannath is taken up as a religious place of importance on the sea coast.[18] The peculiar custom of the place, that of receiving the lord's prasada from the hands of people of a low caste[19] is referred to by the poet who does not forget to mention the wooden nature of the idol

12. Visvagunadarsa, p. 60, sl. 90.
13. Ibid., p. 59, sl. 89.
14. Ibid., p. 60, sl. 91.
15. Ibid., p. 61, sl. 92.
16. Ibid., p. 63, sl. 96.
17. Ibid., p. 66, sl. 101.
18. Ibid., p. 72, sl. 112.
19. Ibid., p. 72, sl. 113.

of the place.[20] The celestial chariot proceeds a long distance and now sights the land of Guzerat. The people are of a fashionable nature and delight in chewing highly perfumed betel leaves and nuts, wearing excellent clothes on their bodies fully ornamented and scented.[21] This is so not in the case of men alone. Those of the other sex are not a whit behind in their beauty or fashion. Their fair complexion and vermillion lips are enough to excite youths.[22] The criticising attitude of Krisanu cannot but blame the mercantile nature of the people who wander about in distant lands carrying on trade in gem leaving their fair wives to pine away in their homes.[23]

Again traversing a long way Jumna is reached and the river's associations with Krishna are referred to. Going again a considerable distance the car soars high over the Maharashtra territory. From the sneers of Krisanu we gather some account of the Maharashtras of the day. The Brahmins of the place, generally village karnams by profession, are men of varied activity having scarcely any time to perform daily ablutions at the proper time.[24] Upanayanas and marriages are performed at wrong times only to enjoy the mirth of the occasion and the young students learn the Yavana Script (Urdu) to the detriment of Vedic lore.[25] No wonder they are capable of speaking only the common language of the country and keep silent unable to utter manthras in a language Greek and Latin to them.[26] Their profession necessarily turns out to be that of serving the Yavana (Mussalman) king, and what is more—pilfering by balancing accounts in villages, thus duping their ignorant masters.[27] But then the generous nature of Visvavasu gives us the better side of the picture when he points out that if not for the civil and military profession followed by the Maharashtra Brahmins the land would long ago have been overridden by the Yavanas (Muslims).[28] It is noteworthy and important to learn that the military capacity of the men is stressed here.[29] This information is of particular interest since the Maharashtras of the poet's day were sturdy

20. Visvagunadarsa, p. 73, sl. 114.
21. Ibid., p. 74, sl. 115.
22. Ibid., p. 74, sl. 116.
23. Ibid., p. 75, sl. 117.
24. Ibid., p. 84, sl. 133.
25. Ibid., p. 85, sl. 134.
26. Ibid., p. 85, sl. 135.
27. Ibid., p. 86, sl. 136.
28. Ibid., p. 88, sl. 141.
29. Ibid., p. 90, sl. 144.

warriors fighting with the mighty Mussalman kings of the day. That the Brahmins filled the king's offices in the state is clearly indicated by the posts held by such eminent men as Balaji Row etc.

Coming to the country of the Andhras Krisanu deplores the Brahmins of the place preparing accounts of villages as karnams for their lords who happen to be sudras and is yet more discomposed at seeing a rare specimen of a Vedic scholar engaged in cleaning dirty vessels.[30] Visvavasu is pleased at the pious nature of some of the Andhra Brahmins who after a bath in the Godavari worship the sacred symbols of Siva in the form of lingas made of sand with their own hands on the banks of the river.[31] This is quite true of the place, which is noted for its Saivite importance possessing holy sites such as Kotilinga, etc., where the custom of worshipping hand-made lingas on the banks of the river is followed even to-day by many. Visvavasu's mention of the religiously minded dwelling in the land between Godavari and Krishna[32] gives us a rough idea of the Andhra territory an important portion of which lies between both rivers. Krisanu now laments the ravaging nature of the Mussalman hordes riding horses swifter than wind plundering and devastating temples Saivite and Vaishnavite;[33] but the generous nature of Visvavasu forgives the cruel depradations of the people considering their worth as warriors of valour. He does not mind their being given to drunkenness, ravaging the country, abducting fair women and abusing the scriptures in view of their valour on the battlefield.[34] This picture of the Andhra country is quite a true and graphic one of the poet's time. The sudra kings are the famous and renowned Reddy and Nayak chiefs who held sway over many parts of almost the whole of south India first as vassals and later independent of the Vijianagar emperors. The depradations of the Pathans and other Mussalman hordes in the Andhra territory about that time is historically accurate and the presence of the Mussalmans everywhere that the poet talks of is no exaggeration.

Karnataka the land of the Canarese or Kannada people is the first of a series of places of which the poet has authoritative infor-

30. Visvagunadarsa, p. 95, sl. 154.
31. Ibid. p. 97, sl. 158.
32. Ibid., p. 97, l. 10.
33. Ibid., p. 98, l. 7-8. sl. 161.
34. Ibid., p. 98, l. 7-8 ; p. 99, sl. 164.

mation and minute details to give, all of them being quite familiar to him. Every town in this tract of land is said to possess gardens full of blossoming arecanut trees.[35] People with ashes smeared over their body and with lingams hanging on their necks are said to swarm this land.[36] Their custom of bathing the lingam in polluted water is specially noted.[37] These people known in vernacular as Lingadharis or Lingayats are even to-day common in the Mysore area and are sudras by caste.

Yadagiri is a place of note hereabouts and a Vaishnavite temple is located on the hill.[38] As a place of antiquity it has its own legendary connections. Garuda is said to have brought the white clay from Svetadwipa in times long past and it is freely used by the Vaishnavas of the place as a mark on the forehead.[39] A holy tank of importance is situated closeby and its sanctity is believed to be like that of the Ganges.[40] This holy place is modern Melkote in the district of Hassan of Mysore; and it is interesting to note what the Indian Companion says under that head. It is "a sacred village and municipality with population about 2,500 of which the majority are Sri Vaishnava Brahmins. Formerly a great city, of which only the ruins now remain. In the 12th century the Vaishnava reformer, Ramanuja lived here for fourteen years, having fled from the persecution of the Chola king. It thus became the chief seat of Vaishnava Brahmins who converted to their sect the Ballala dynasty and obtained rich endowments. The principal temple, dedicated to Krishna under the name of Cheluvapulla Raya was under the special patronage of the late Maharaja of Mysore, and possesses a valuable collection of jewels. A more striking building is the temple of Narasimha situated on a rocky eminence. The Vaira Mudi festival is annually attended by 10,000 persons. The guru or priest of the Sri Vaishnava Brahmanas has his residence here; and about 400 priests are attached to the great temple, of whom some are men of learning. A white clay called Nama found in the neighbourhood which has been formed by the decomposition of schistose mica, is used by the Sri Vaishnavas for paint-

35. Visvagunadarsa, p. 100, sl. 166.
36. Ibid., p. 101, sl. 168.
37. Ibid., p. 101, sl. 169.
38. Ibid., p. 102, sl. 170.
39. Ibid., p. 103, sl. 173.
40. Ibid., p. 103, sl. 174.

ing the sectarian mark on their foreheads, and is exported for this purpose as far as Benares.

Sighting Rajatasanupura, its association with Anandatirtha (Madhwa) is referred to by Visvavasu.[41] This the birth place of Anandatirtha being peopled mostly by Madhwas, Krisanu takes the opportunity to criticise that community. The late performance of Sandhya by the generality of the Madhwas is only a minor sin[42] considering the faults of their guru who wanders about the country in a palanquin hankering after wealth wedded as he is to the life of an anchorite free from worldly desires.[43] That even the learned of the community should believe in relief from sin by the two acts, quite against scripture which prescribes an immediate bath at the sight of an ascetic on a vehicle and Chandrayana prayascitta on partaking of his food, is really a great wonder to this critic.[44] He deplores the pathetic life of ragged householders being fed in palatial stone-hewn monasteries by muslin clothed ascetics travelling on palanquins.[45] Their neglect of Vedas and importance attached to sastras is also a subject of criticism.[46] Krisanu heartily laughs at their habit of using flour made *pasu* in the place of a live one and funnily remarks that their household fire being already polluted by their neglect of sacrifice on Ekadesi days the use of a living animal is a mere wasteful cruelty. But then Visvavasu explains away all these foibles with a generous outlook and appreciates their great faith in Narayana and their fasting on Harivasa.[47, 48]

In the fourth volume of the collected works of R. G. Bhandarkar,[49] we have the information, " According to the Madhwavijaya or the history of the triumphs of Madhwa, by Narayana, the son of Trivikrama, there was in the town of Rajathapitha a family known by the name of Madhyageha. Madhwa's father was called Madhyagehabhatta, and under this in a footnote there is an extract quoted from the Imperial Gazeteer "Kallianpur in the Udipi taluka of the district of South Kanara is stated to be the birth-place of Madhwa.[50]

41. Visvagunadarsa, p. 104, sl. 176.
42. Ibid., p. 104, sl. 177.
43. Ibid., p. 105, sl. 178.
44. Ibid., p. 105, sl. 179.
45. Ibid., p. 106, sl. 180.
46. Ibid., p. 106, sl. 181.
47, 48. Ibid., p. 107, sl. 183.
49. The Collected Works of R. G. Bhandarkar, vol. iv, p. 82.
50. Imp. Gaz., vol. xiv, p. 314.

It was probably the same as the Rajathapitha of the Madhwavijaya. The commentator of Visvagunadarsa gives the vernacular name for Rajapithapura as Suvanur. So then it is a question whether this same Kallianpur is Suvanur in the vicinity of Udipi wherein "there are eight maths (Hindu Monastaries); and the management of the temple, which is very ancient and largely endowed is held by the heads of these maths in rotation for two years each."[51] Though the customs that Krisanu criticises persist even to-day one would do well to view them from the standpoint of Visvavasu who sympathises with the gurus for their inability to walk long distances and excuses their collection of money in view of their liberality in feeding householders with food offered to God which ceased on that account to be an ascetic's food.[52]

Coming to the Sesha Saila (Tirupathi) the divine pilgrims describe the wild scenery on the hill which abounds in various trees, caves, streams and such others of the sylvan element.[53] The peculiarly large number of monkeys that swarm the mountain is specially noted by the poet.[54] The legends connected with the place are not forgotten. The Lord's begging for a drop of water in the wood, his carrying mud to help a man digging a deep well, his wearing a garland of earthen flowers are all stated.[55] Some of the miracles of the place are the deaf man hearing the song of the mute, the maimed one writing it for the blind man to see, the cripple climbing up the cliff and the barren woman big with child.[56] But all the same the Lord does not escape the caustic tongue of Krisanu. He questions why Venkatesa terrifies people forgetting to pay him the promised amount, even after attaining their desire and extorts from them interest with the capital.[57] The custom of people praying to god Venkatesa for a particular thing and promising him this and that on their success in getting it, their usual forgetting the promised thing in their joy on their success, and the Lord's threatening in miraculous ways (by means of *avesams*), and the final payments with additions is no unusual thing even to-day.

51. Indian Companion.
52. Visvagunadarsa, p. 108, sl. 184; p. 109, sl. 186.
53. Ibid., p. 112, sl. 192.
54. Visvagunadarsa, p. 119, sl. 205.
55. Ibid., p. 114, sl. 197.
56. Ibid., p. 118, sl. 204.
57. Ibid., p. 114, sl. 196.

To the south of Tirupathi hill there are wild forests thickly populated by various wild beasts, robbers and hunters.[58] Even to-day when the ravaging hand of man has worked the ruin of many a stately woodland tree we find not a few rich forests covering the slopes of the Seshachalam hills.

Further south is situated Ghatikachala (Sholingar) with Narasimhaswami on the hill top.[59] From here the chariot proceeds to Viksharanya. The lake of this place goes by the name of Hrittapanasini and is reputed to relieve men of their miseries; on its bank is situated Lord Viraraghava worshipped by sage Salihotra in times of yore. The place is also honoured by the arrival of a river called Kusasthali.[60] This Viksharanya is the same as modern Tiruvellore. Under the head Tiruverrul Mr. P. V. Jagadisa Aiyar has this information—"(modern Tiruvellore near Madras). This is also called Vedharanniam. Sage Salihotra worshipped the Lord Viraraghava here."[61] Vesharanniem is perhaps a misprint for Viksharanya. Krisanu refers to the Venkatesa like habit of Viraraghavaswami,[62] to whom not a few devotees pray to attain their own ends. The various prarthanas like dissolving jaggery in the tank of the temple, Hrittapanasini, are as usual to-day as ever.

The aerial car now leaves for Bhutapuri which is the same as modern Sriperumbudur. This is the birth-place of Ramanujacharya who gave to the world the essence of the Upanishads in the form of his polemical treatises.[63] The very mention of the name of this great philosopher is enough to loosen the stinging tongue of Krisanu who gives us a catalogue of the defects of the followers of Ramanuja. These people peculiarly known as *Tengales* are particularly scrupulous in avoiding eating in the company of other sects and more often than not exclude even those of their own community from the privileges of interdining.[64] Another feature about these people that annoys Krisanu is their peculiar fondness towards Tamil Prabandhas to the utter neglect of the Scrip-

58. Visvagunadarsa, p. 120, l. 3-4; p. 121, sl. 208.
59. Ibid., p. 122, l. 6, sl. 211.
60. Ibid., p. 125, sl. 219.
61. South Indian Shrines, p. 539.
62. Visvagunadarsa, p. 126, l. 1-2.
63. Ibid., p. 127, sl. 223.
64. Ibid., p. 130, sl. 229.

tures in the sacred tongue (Vedas) which attitude our amiable critic compares to the foolishness of a man desirous of milk going in quest of a cowherd's hut even when standing on the shores of the milky ocean.[65] He is further displeased with them for neglecting the five daily sacrifices laid down in scriptures, for confusing the ignorant with the Tamil Prabandhas, for abusing sacrifices in general, for very often obstructing the worship of the Lord (by sectarian quarrels), for abusing the good and great, for discontinuing Sraddha ceremonies and for making ascetics bow to householders.[66] He impeaches them for the high offence of neglecting the sounding of the bell at the performance of worship and for depreciating the divine worth of Sri, the mother of the three worlds and for taking an idle pleasure in drinking the water with which they had washed their feet.[67] Their neglect of Tarpana, etc., on holy occasions like the eclipse and Samkramana with the impudent remark that all that is Kamya Karma irritates our critic: [68] as also does their hypocritical behaviour and counterfeited humility coupled with their dexterity in confusing even wise men by their lying tales of a thousand traditions.[69] Their narrow-mindedness exhibited in refusing to bathe in the Ganges on account of its association with the Universal Dancer, in the sea because of its salty nature and in the avoiding of *pancagavya* in view of the nature of its origin is not a little displeasing to Krisanu.[70] The so-called acharyas of the community who live on the money given them by rogues, bandits and such other low men who plunder and kill people on the way in hills and forests, getting themselves initiated by them into the mysteries of manthras after the regular marking of the discus on their bodies do not escape his eye.[71] The mere accepting of one as a guru simply because of his birth in a particular family of hereditary gurus, in spite of his utter stupidity is deeply bemoaned by the critic[72] who feels quite sure that the thoroughly illiterate acharyas of these thieves and hunters can in no way help either themselves or their disciples. Visvavasu now comes forward to argue on behalf of these people of shattered reputation and elo-

65. Visvagunadarsa, p. 130, sl. 230.
66. Ibid., p. 131, sl. 231.
67. Ibid., p. 131, sl. 232.
68. Ibid., p. 132, sl. 233.
69. Ibid., p. 132, sl. 234.
70. Ibid., p. 133, sl. 237.
71. Ibid., p. 144, sl. 249.
72. Ibid., p. 146, sl. 253.

quently pleads for the Tamil tongue in which the Prabandhas are written. He questions as to how a language with its grammar written by the sage Agastya is inferior to that which owes its systematised grammar to the sage Panini.[73] The Prabandhas, he holds, are great in three ways first, because of their being in a language which was systematised by Agastya, second, because of the composers of the same being Satagopa and others and third because of their being read by Ramanuja and others.[74] The reclamation of the thieves by the guru through mudradana, etc., he compares to the purifying agency of the Ganges.[75] This section is an important one in view of the fact that we get ample information about the Tengale sect of the Sri Vaishnavas. " Ramanuja founded no less than 700 colleges and sought to secure the permanence of his religious system by establishing 89 hereditary guruships. Those at Conjeevaram, Srirangam, Rameswaram, Totadri and Ahobilam still remain." [76] It is this hereditary sort of guruship about which the poet grumbles.

The divine dyad now proceeds to the famous pond Kairavini on whose brink is situated the temple of Parthasarathi.[77] And Krisanu does not feel happy without finding out something to detract from the greatness of the place. For him the very situation of a town in the vicinity thickly populated by Huns (Europeans) notorious for their lack of good traits is itself a sufficient blemish for the temple.[78] He grows vexed at the immense wealth of the cruel Hunas who are *saucatyagins*[79] and condemns Brahma's generosity which in his opinion is quite out of place. But Visvavasu gives us a better picture of these men who in his opinion never rob another of his wealth by force, never speak an untruth, do wonderful things and punish culprits according to law.[80] What these wonderful things are is difficult to understand. The commentator takes those for glass vessels and spectacles. We know from History that the English merchants brought articles of luxury to the East and took back home spices and precious metals. Some of these articles

73. Visvagunadarsa, p. 136, l. 10-11.
74. Ibid., p. 137, sl. 245.
75. Ibid., p. 148, sl. 258.
76. Indian Companion—Sriperumbudur.
77. Visvagunadarsa, p. 149, sl. 260.
78. Ibid., p. 150, l. 3-5.
79. Ibid., p. 150, sl. 262, 263.
80. Visvagunadarsa, p. 151, sl. 264,

of luxury might have been the wonderful things alluded to by the poet. The coach that was presented to Jehangir by Sir Thomas Roe was a novelty in India and the poor monarch sat, it is said, in the wrong place on the top of the carriage. Such rare specimens might contribute to the wonder of the people regarding them. Regarding the Europeans' just collection of money and punishing culprits according to their crimes we have some information in the Encyclopaedia Britannica: "From a simple trading company, it grew under his (Charles II) reign into a great chartered company to use the modern term with the right to acquire territory, coin money, command fortresses and troops, form alliances, make war and peace and exercise both civil and criminal jurisdiction."[81] It is the last function of the company that the poet refers to and the Hunas are the famous merchants of the East India Company settled in Madras very near Tiruvallikkeni which takes its name from the famous Kairaveni pond of which mention is made by the poet. The reference to the wealth of the Hunas is no exaggeration when we see that "the great prosperity of the company under the Restoration, and the immense profits of the Indian trade, attracted a number of private traders, both outside merchants and dismissed or retired servants of the company, who came to be known as interlopers." The cruel rapacity of these wandering merchants of that time is no untruth as we have the explicit statement of the Encyclopaedia Britannica which, describing Sir John Hawkins as "greedy, unscrupulous and rude," says that "his morality was that of the average stirring man of his time, whether in England or elsewhere." One would not wonder at the poet's disgust for the Hunas after a perusal of Burke's "Impeachment of Warren Hastings" which gives us an insight into the culpable character of the company's servants.

Proceeding five yojanas* to the west, the car sights Canchi.[82] This accuracy of distance between Triplicane and Conjeevaram is striking. The first to be taken up is Vishnu Canchi where the Lord is stationed on Hasti Saila.[83] To the south of this place flows a river called Vegavathi.[84] This river is said to have been an obsta-

81. Encyclopaedia Britannica—East India Company.
* A yojana is roughly eight or nine miles.
82. Visvagunadarsa, p. 152, sl. 265.
83. Ibid., p. 152, sl. 265.
84. Ibid., p. 152, l. 8.

cle in the way of Brahma performing a sacrifice upon which Lord Varada is reported to have stopped its course.[85] The Hasti Saila is a small elevated mound on which the Lord's shrine is stationed and a visit to the temple would elucidate the point. The river Vegavathi, though almost on the point of disappearance yet lingers in the shape of a dirty rivulet with a cremation ground adjacent to it. The poet now goes to minute details and gives us some more information about the place. The name of the divine consort of Varadaraja, Komalavalli, is given out.[86] The famous tank Anantha Saras in the temple, in whose vicinity is situated Punya Koti Vimana the northern portion of which is honoured by the presence of the Lord and Kalyana Koti Vimana the abode of Lakshmi are mentioned as also are the minor sanctuaries of Rama, Yadava and Varahamurti.[87] In the Indian Architecture it is stated that "the vimana of the temple is known by the name of punya-koti vimanam and its construction is ascribed to the Vijayanagar King, Krishna Deva, of the early part of the 16th century A.D." In the same book Anantha Saras is referred to as the Teppakulam. The poet does not forget to mention two more tanks Pushya and Karindrasaras to the north and south of the temple respectively,[88] and also the God Dipaprakasa situated somewhat further away to the west of the temple.[89] Karindrasara is the tank very near the shrine of the Goddess Ashtabhuja.[90] The temple of Dipaprakasa is a minor one and he is known as Vilakkoli perumal. In the Indian Architecture we have the information that "of the temples dedicated to Vishnu, Attiyur Varadaraja, Parameswara Vinragar, Vaikuntha Perumal, Tiruppadagan Pandavaperumal, Tirutanka Vilakkoli Perumal, Attabuyagaran Astabhuja and Uraghan Ulagalanda Perumal are considered important." It is to those last four deities that Venkatadhwari attaches some importance as also to one Narasimha Swami on the banks of Vegavathi.[91] The gopura of Trivikramaswami is mentioned as a tall one.[92] This Trivikrama is the same as the famous Ulagalantha Perumal in a shrine west of Kamakshi Amman temple. The poet mentions Pan-

85. Visvagunadarsa, p. 157, sl. 276.
86. Ibid., p. 158, sl. 278.
87. Ibid., p. 156, sl. 275.
88. Ibid., p. 161, sl. 284.
89. Ibid., p. 162, sl. 286.
90. Ibid., p. 161, sl. 285.
91. Ibid., p. 170, sl. 301.
92. Ibid., p. 172, sl. 317.

davadutaswami when he describes at length Lord Ekamreswara since the temple of the former is to the west of Ekamreswara Sannadhi street.[93] Vishnu Canchi having been the famous abode of the erudite scholar, poet and reformer Venkatanatha, the poet takes the opportunity to praise him as also the Vaidic and Sastraic nature of his followers who happen to be the very contrast of the Tengale community.[94] That Canchi was a seat of learning is clearly stated by the poet even in the very beginning of the description of Canchi.[95]

Coming to Siva Canchi the most important deity of the place, Kamakshi, is praised as the ornament of the town and her too famous beauty is emphasised.[96] Her consort, Ekamreswara, here appeared to the world under a mango tree on the banks of the river Kampa.[97] Venkatanatha, in his 'Hamsasandesa,' mentions that there was a big mango grove in that place. Even to-day the mango tree near the Lord's sanctuary is important. Kampa is no more a river but is merely a big tank in the temple. The poet finally lauds the city with two Gods at its east and west end.[98]

Vijayaraghava situated close to the tank Gridhrasaras[99] is the next deity that arrests the attention of the divine travellers. This tank is associated with the eagle Jatayu whose earthly remains were given to the fire by Rama.[100] The wonder of this place is the sprouting of the fried grains offered to the Lord by barren women desirous of children.[101] This is an exaggerated way of stating the motherhood bestowed on many a barren woman by the Lord. In the 'South Indian Shrines,' this place known as Tiruppukkuzhi is stated as one of the Nuttettu Tirupathi. This place is seven miles west of Conjeevaram. "Jatayu worshipped the Lord who appeared as Vijayaraghava. There is the figure of Jatayu also here." [102]

To the south[103] flows the Kshiranadi (Palar) whose purity the poet compares with that of Ganga, Sindhu, Saraswathi, Bhavahara,

93. Visvagunadarsa, p. 189, sl. 342.
94. Ibid., p. 165, sl. 293.
95. Ibid., p. 152, sl. 266.
96. Ibid., p. 175, sl. 312, 313.
97. Ibid., p. 179, sl. 320.
98. Ibid., p. 187, sl. 337.
99. Ibid., p. 191, sl. 345.
100. Ibid., p. 191, sl. 346 ; p. 192, sl. 347.
101. Ibid., p. 192, sl. 348.
102. South Indian Shrines, p. 539.
103. Visvagunadarsa, p. 193, l. 4.

Tungabhadra, Yamuna and Kaveri.[104] What this name Bhavahara denotes is a difficult question ; but it may not be wrong to identify it as Bhavani river, a tributary of the Kaveri. It is difficult to know what Krisanu means by calling the river ' Nirasa '[105] (which adjunct satisfies its modern waterless condition) when Visvavasu refers to people bathing in it.[106]

Another river flowing south of the former one is Bahanadi[107] on whose northern bank is situated an agrahara going by the name of Arisanipalagrama.[108] This village irrigated by many channels running from the river and peopled by many Brahmanas of the Atreya Gotra interested in sacrifices and headed by Raghunatha, the poet's father, happens to be situated very near the picturesque spot where Palar and Bahanadi unite.[109] This Bahanadi is known in vernacular as Cheyyar and the village is in the Cheyyar Taluq of N. A. district, since the river joins Palar only in this area. The poet also talks of many other villages of the agrahara type on the banks of the river.[110]

Now everywhere the eye looks at the vast expanse of Tundiramandala[111] (Tondaimandala) whose villages lie on the banks of Palar which happens to be one of the principal rivers of the territory.[112] Krisanu observing the overfondness of the people of the place for doing sacrifices laughs at them for indulging in unnecessary animal slaughter,[113] when his companion points out to him their necessity in doing them in view of the fact of the Vedas recommending their performance ; incidentally he also sneers at the Tengale people of the Vaishnava community hating sacrifices in spite of the explicit statements of their Acharya who denied cruelty in the slaughter of animals in sacrifices.[114] In Visvavasu's remark that abandonment of sacrifices as a cruelty is as foolish as the dis-

104. Visvagunadarsa, p. 193, sl. 351.
105. Ibid., p. 194, l. 3.
106. Ibid., p. 193, sl. 351.
107. Ibid., p. 195, sl. 355.
108. Ibid., p. 195, l. 6.
109. Ibid., p. 195, sl. 356 ; p. 196, sl. 357, 358.
110. Ibid., p. 196, sl. 358.
111. Ibid., p. 197, l. 2.
112. Ibid., p. 197, sl. 361.
113. Ibid., p. 198, sl. 362.
114. Ibid., p. 200, sl. 366.

continuance of marking the body with the chakra emblem on the plea of pain we get to know of this custom of emblem-marking.[115] In another verse the poet actually describes the method of imprinting the emblem with a red hot block.[116] This too much stress on Vaishnava customs makes us conclude that the poet is referring to those of the villages of North and South Arcots and Chingleput which are mostly populated by people of that community.

The aerial travellers now sight Chancheepura[117] which affords protection to many a learned scholar and philosopher. The beautiful fort on the hill with its impregnable parapet wall exacting the greatest toil and bloodshed in the camp of the enemy kings desirous of taking it is specially referred to.[118] Rulers of distant kingdoms coming all the way to capture this fort and city despite the loss of life in their own armies and the very great personal risk involved, is a matter of great curiosity to Krisanu.[119] The noble valour of these warring chiefs who though opulent and loving husbands of beautiful wives cared not for aught when the question of personal honour and dignity and a glorious loss of life on the battlefield came up is eloquently put.[120] This Gingee has been wrongly identified by the commentators as Tanjore. The very next description is that of the two rivers Pinakini and Garudanadi ; after that, that of Mushnakshetra. All these are in the South Arcot District close to Gingee. We know from History the great troublous story of Gingee about this period (the middle and latter half of the 17th century). It was one of the most famous of the strongholds of the south of that time. The poet's explicit statement about the fort on the hill is overlooked by the commentators, who, to give out Chanchi as Tanjore, explain the verse as meaning an "impassable Town with rampart walls like a hill." The hill forts of Gingee are very famous and were occupied by the Nayak chiefs of Vijayanagar, by Sivaji and the family of the famous Jayasimha (Desinga Raja) in succession. It was also attacked and subjugated by the Muhammadan hordes for a time. So, then there is no doubt as to which place the poet refers.

115. Visvagunadarsa, p. 202, sl. 370.
116. Ibid., p. 202, sl. 371.
117. Ibid., p. 203, sl. 373.
118. Ibid., p. 204, sl. 375.
119. Ibid., p. 205, sl. 376.
120. Ibid., p. 205, sl. 377.

The river Pinakini now referred to is known as Dakshinapinakini or Penniar; another river with very little water in it is Garudanadi which is popularly known as Gadilam.[121] This river is fed by the Mallattar, which connects it with Pennar.[122] On its bank is situated the temple of Devanayaka.[123] This deity is the Devanayaka Perumal of Tiruvendipuram of the South Arcot District.

Further on, there is the Sri Mushnakshetra[124] situated close to the Pinakini river which flows in this place through a forest region.[125] The deity of this place is Adivarahamurthi. Sri Mushnam is now a small village in the South Arcot District.

The car now proceeds and reaches the river Kaveri known also by the name Suvarnanadi and Hemapaga.[126] The situation of Sri Ranganatha in the centre of the river is also referred to.[127] Various trees and plants like Vakula, Amalaka, Kadamba, Mandara, Sahakara (Mango), Jambu, Kapittha (wood apple), Kramuka (Arecanut), etc., growing on the banks of the river[128] appear on account of the blossoms at their top, like passengers ready to cross the river with their clothes on their head.[129] This is a very true and charming picture of how the South Indians cross a river and it speaks volumes of the close observation of detail in life. Mango trees are specially stated as plenty near the river[130] and this is no exaggeration when even to-day the region of Kavery abounds in that species of trees. The rise of the river in the Western Ghats is stated when in imitation of Venkatanatha our poet describes the course of the river from the Sahayadri (Western Ghats) to the sea comparing her to a bride bound for her husband's home.

Sriranganagara is now the object of the eye and the scholarly lives of its inhabitants is very much exaggerated[131] by the poet by

121. Visvagunadarsa, p. 207, sl. 381.
122. Indian Companion.
123. Ibid., p. 207, sl. 381.
124. Ibid., p. 208, sl. 382.
125. Ibid., p. 209, sl. 384.
126. Ibid., p. 216 sl. 391, 392.
127. Ibid., p. 217, sl. 394.
128. Ibid., p. 213, l. 1-5, p. 214, l. 1-9, p. 215, l. 1-8, p. 216, l. 1-3.
129. Ibid., p. 217, sl. 395.
130. Ibid., p. 217, sl. 393.
131. Ibid., p. 218, sl. 396, 397.

saying that parrots, peacocks, and cuckoos enter into polemical and other kindred discussions. The seven prakaras of the temple of Ranganatha with the Pushkarini tank are mentioned.[132] The name Chandrapushkarini of the tank is also specially stated.[133] In the Indian Architecture it is stated that there are several Gopurams or towers to this temple, each of them having a design of its own and differing from its neighbour in the outline, details, and size; but the whole mass is so harmoniously blended as to impress any visitor or engineer with the sublimity of its design and the mastery of its construction. The whole temple consists of seven prakaras or enclosure walls, with streets and dwelling houses round and round the inner shrine. Lakshmi, the consort of the Lord, and Garuda are noted.[134] The Garuda Mantapa in the Srirangam Temple is worthy of notice. Krisanu hates the practice of this place, that of offering the Lord's prasada for sale and condemns in strong terms the priests of the temple who are the perpetrators of that sin.[135]

Not far from Srirangam and on the banks of the river Kaveri, there is the Saiva shrine of Jambukeswara with four prakaras.[136] The poet by an equivocal use of the word 'Sapta prakaras' tries to compare the temple with that of Ranganatha. The poet himself explains this ambiguous word as meaning 'Jatadhara,' which is further explained by the commentators to mean four. But then there are five prakaras for the Jambukeswara temple. The particular phenomenon of this place, that of the lingam bathed perpetually by water is referred to by the poet as the Kaveri drenching the Lord perpetually.[137]

These two last-referred places being situated in Choladesa, some account of the territory is now given. This territory which is everywhere filled with Siva and Vishnu temples is famous for its mango groves and arecanut trees entwined by high class betel leaf creepers.[138] The banks of the Kaveri abound in tall cocoanut

132. Ibid., p. 221, sl. 402, p. 239, sl.. 441.
133. Ibid., p. 223, sl. 406.
134. Visvagunadarsa, p. 227, sl. 416, p. 234, sl. 431.
135. Ibid., p. 237, sl. 438, p. 238, sl. 439.
136. Ibid., p. 239, sl. 442.
137. Visvagunadarsa, p. 240, sl. 445.
138. Ibid., p. 241, sl. 446, 447.

palms laden with fruit as if to offer them to the Lord in the orbit of the Sun.[139] Punnaga trees are abundant in this place.[140]

The people of the place are described as intent on doing sacrifices, reading Vedas, sastras, and puranas;[141] but Krisanu feels vexed with them for eating puratana (cooked rice preserved in water for the night) in spite of their bath in the river, performance of the Sandhya, etc., study of sastras, worship of gods and hospitality to guests.[142] The peculiar feature about the women of the place is that they wear no petticoat.[143] The poet describes one other custom of this place, that of women collecting in large numbers to sing love songs outside the house of any girl attaining puberty.[144] In two more dubious verses which are ascribed to the poet's pen there is given a picture of the typical Chola daughter-in-law with her hair, eyes, mouth and breasts, bereft of oil, collyrium, betels and sandal paste respectively and devoid of good dress and flowers; her shoulders marked with the stain caused by the bearing of water-pots (here the poet refers to their peculiar custom of carrying water-pots on their shoulders) her feet covered with dung stuck to them in the act of trampling it (here there is a reference to the trampling of cow dung before making it into cakes), her hands all rough because of cutting grass (here the custom of cutting or gathering grass for cattle), her eyes all red with the smoke of the kitchen (here a reference to the exclusive duty of cooking given to the daughter-in-law), she is the very incarnation of misery.[145] Though a bit exaggerated, there is a good deal of truth in the custom to which reference is made by the poet and it is a good picture of the South that we get from his pen.

Near by, there is Kumbhaghonam on the banks of the Kaveri and reference is made by the poet to the Vaishnavite temple of the Deity Sarangapani.[146] Not far off in Champakaranya is situated Sri Rajagopalamurthi,[147] who is the same as the deity at Mannar-

139. Visvagunadarsa, p. 242, sl. 448.
140. Ibid., p. 242, sl. 450.
141. Ibid., p. 244. s. 452.
142. Ibid., p. 244, sl. 453.
143. Ibid., p. 245, sl. 454.
144. Ibid., p. 245, sl. 456.
145. Ibid., p. 246, The two slokas quoted in the commentary.
146. Ibid., p. 248, sl. 460.
147. Ibid., p. 248, sl. 461.

gudi which is also known as Raja Mannargudi. The Lord is also known as Sanatna Gopala. This temple is perhaps the last that these divine travellers visit in the south. That there are numerous other temples and sacred places of importance is not forgotten by the poet and he makes Visvavasu refer to all of them in an eulogistic tone.[148] Krisanu now comes forward with a woeful tale of the mismanagement of temples by characterless men worshipping the Lord with hands defiled by the touch of prostitutes, muttering mantras with a mouth full of betels chewed by the harlots, and robbing the deity of his wealth with an unflinching hand.[149] The cooks in the temple are also as bad in character, their additional qualification being illiteracy in the sacred lore.

After travelling some more distance the Gandharva pair near the Setu with the foamy waves dashing and springing over the hills sunk in the sea.[150] These mountains in the sea might be the small islands between Dhanushkodi and Ceylon. The power of the sea to absolve the pilgrims of their sins by a bath in its waters is also stated.[151]

Further south flows the river Tamraparni[152] and on its banks is Kurukapuri inhabited by Vaishnavas well versed in Tamil Prabandhas.[153] Kurukapuri is Alwar Tirunagari in the Tinnevelly district and this is the famous birthplace of Sathakopa muni, the author of the Dravida Veda.[154] The tamarind tree in whose shade the sage wrote the work is in this very place. The people of the place are mostly Tengales and Krisanu again repeats his charges against these people.[155] He is particularly hard against the Vaishnava sanyasins who neglect bath about the Sandya time, the bearing of kamandalu, the observance of Chaturmasya and bhikshatana, contentment and study of Vedas ; [156] and more so when he sees them enter capital cities and towns to earn money and eat sumptuously in the name of God.[157] Again, he is not so horrified at the

148. Visvagunadarsa, p. 250, sl. 465.
149. Ibid., p. 251, sl. 466.
150. Ibid., p. 256, sl. 476.
151. Ibid., p. 259, sl. 486.
152. Ibid., p. 260, sl. 487.
153. Ibid., p. 260, sl. 488.
154. Ibid., p. 261, sl. 489.
155. Ibid., p. 261, sl. 491.
156. Ibid., p. 264, sl. 500.
157. Ibid., p. 265, sl. 501.

ascetic bowing to householders as when he sees them bowing to the Sathanis.[158]

This place happens to be the last to be visited by the two divine travellers and we have in their conversations sufficient information about India in the 17th century since the poet merely gives out his account through that dyad, his own creation. Historical information is very great in this book and is of a very valuable nature giving us an insight into the manners and customs of the various people in various parts of this almost a continent-like country; the peculiar customs of minor sects and creeds are not overlooked. The rise of the Mahrattas and their wars with the Mussalmans are important and noteworthy. That the Brahmins of Maharashtra held the posts of karnams or village accountants is clear from Vincent Smith's History of India where it is stated that "the details (of accounts) were purposely made as intricate as possible, so that nobody except the professional Mahratta Brahmin accountants could understand them. All clerical and account work was in Brahmin hands." [159] The state of the Andhra territory as described in the book is not far from truth. Again, the statement about the Gingee fort and territory is of historical value. The peculiar characteristics of the Lingayats of Mysore, the Tengales of Sriperumbudur, Alwar Tirunagari and other places, the Madhwas of Udipi, the English merchants of the East India Company at Madras and the Mussalman warriors holding sway over many a kingdom are interesting and instructive. Whatever might be the bad odour in the sneers and gibes of Krisanu they supply us with a fund of information about the people of the time, their likes, dislikes, tastes and idiosyncracies. But a study of the book would strongly suggest to the reader the advisability to take a view of things akin to Visvavasu's.

Chairman's Concluding Remarks: The Chairman complimented the lecturer on the combined insight and sympathy and the constructive criticism displayed by the address. Geography has been our weak point. North Indian authors do not describe South India well; nor do South Indian authors describe North India well. Our ancient geography will be largely coloured by theology. But we know that the earth is round and moving round the sun and

158. Visvagunadarsa, p. 265, sl. 502.
159. V. A. Smith's Oxford History of India, p. 434.

had a fairly accurate knowledge of India and the surrounding countries. Our passion for Theertha and Kshetra (holy rivers and temples) led to individual purity and communal amity. The author of *Viswagunadarsa* adopted the device of the aerial car from the Ramayana just as Kalidasa took the *sandesa* (message) idea from the Ramayana. But his work shows a Vaidika Vaishnava Brahmin abroad and does not give us a full and complete idea of the court life and the commoner's life or the secular institutions. Even among temples, Saiva temples are largely omitted. When describing Kumbakonam, Sri Sarangapani's temple is described but Sri Kumbheswara's shrine is omitted. Of course Srirangam bulks large but Chidambaram vanishes. Even among the Vaishnavas, the Tengalais come in for caustic comment. The commentator's limitations are seen in his taking Chanjipuri to be Tanjore instead of saying that it is Gingee. The poem introduces two Gandharvas—Krisanu and Visvavasu—as describing the various places seen by them from Badari to Setu. Krisanu is the destructive critic and Visvavasu is the constructive critic. When describing Madras, the former laments the loss of purity and tenderness in life but the latter praises the elements of order and progress and justice and inventive skill which we owe to the Hunas (the English). It thus appears that the real welfare of India consists in combining these elements with purity and unity.

With a vote of thanks to the Chairman and the Lecturer, the meeting came to a close.

The Distribution of Crops in the Vizagapatam District*

By

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The variation in the cropping of the different tracts of this district affords an interesting study to students of agriculture as well as to those of Geography.

Only six principal crops will be dealt with here, in some detail, paddy (Oryza sativa), ganti (Pennesetum typhoideum) and chodi (Eleucine coracana) being the chief food crops and gingelly (Sesamum indicum) groundnut (Arachis hypogea) and sugarcane (Sacharum officinarum), the chief money crops.

In considering the distribution of these crops the district may be divided into three broad divisions, the Agency, the northern taluks of the plains and the southern taluks of the same. Statement I appended shows the area under the different crops as well as the rainfall in the three seasons, the hot weather, South-west Monsoon, and North-east Monsoon.

Paddy is the most largely grown and the most ubiquitous of the crops. It is extensively grown in almost all the taluks under conditions good, bad and indifferent, on account of its high status among the food grains and its being capable of easy cultivation wherever there is sufficient rainfall or water for irrigation. Till the slump in its price came on recently, this was, in addition to being a food crop, also a money crop, the surplus produce finding a ready market at a fair price so that the ryots were anxious to possess as much wet land as possible. The two Agency taluks of Naurangapur and Jeypore show the largest area under this crop, which runs up to nearly 5 lakhs of acres out of a total of about 11 lakhs in the whole district. The large extent of fertile land avail-

Summary of a lecture delivered under the auspices of the Vizagapatam Branch of the Madras Geographical Association.

able there and the assured rainfall of over 50 inches admit of its cultivation, mostly without irrigation, on such a large scale and with very little trouble or cost. In the Taluks of the plains facilities for irrigation chiefly determine the area. Palakonda Taluk, which has the advantage of the Nagavali system, possesses the largest area of nearly a lakh of acres under this crop, while the others possess areas ranging from about twelve to sixty thousand acres, the extent depending upon the area of the taluk and its irrigation facilities, and present no interesting features.

Chodi and *Ganti* are two other important food crops and their distribution is somewhat interesting. Ganti being a native of dry tropical Africa is little grown in the agency tracts which are too cold and receive a heavy rainfall. Chodi on the other hand tolerates cold as well as heat and moisture and is therefore grown largely both in the plains and agency tracts. The greater portion of the area under Chodi lies in the agency and is shared by the Pottangi and Padwa Taluks which grow nearly half the total area of 5 lakhs under this crop in the district. In the plains, while in the northern taluks Chodi predominates, Ganti does so in the southern taluks as shown in the statement below :

	Area in Acres.	
	Northern Taluks.	Southern Taluks.
Chodi	153607	50453
Ganti	74839	123316
Ratio of Ganti & Chodi	67 : 33	29 : 71

The ratio of Ganti to Chodi are 67 : 33 and 29 : 71 for the northern and southern taluks respectively. Why should these ratios be thus the reverse of one another in the two areas ? The answer is somewhat difficult to find. The average rainfall in the northern taluks in the "Tholakari" season is no doubt somewhat heavier than in the southern taluks, but this difference does not appear to be large enough to warrant such a thorough reversal of the ratio, for a large difference in this respect between the eastern and the western taluks of each area does not result in a similar variation in the areas of the two crops.

When, however, this difference in rainfall is considered with the nature of the soil, which is generally shallow and not quite so well drained in the northern taluks as in the southern ones, the phenomenon appears somewhat explicable.

Gingelly and *Groundnut*, the two oil-seed crops of the district, also present a similar phenomenon. The areas under these two crops are noted below :

	Area in Acres. Northern Taluks.	Southern Taluks.
Groundnut	95041	20871
Gingelly	45313	73744
Ratio	68 : 32	23 : 77

Like Ganti, Gingelly does not tolerate excessive moisture and therefore appears to be preferred in the southern taluks to Groundnut which not only tolerates greater moisture but requires the soil to be evenly moist during the period of its growth which is longer than that of gingelly. The former is uncertain especially in regions of heavier rainfall and ill-drained shallow soils as in northern taluks, while the latter suffers in regions where the soil dries off more quickly during spells of drought, as in the better drained soils of the southern taluks.

The area under *sugar-cane* in different taluks is influenced by the facilities for irrigation which the crop requires during the greater part of the year and the nature of the soil. If the latter is not favourable the crop does not adequately repay the trouble and heavy expense of irrigation, manuring and other operations which its cultivation specially involves. The alluvial soils on the sides of the Varaha in the Golgonda Taluk, the Sarada in the Viravalli, Anakapalli and Sarvasiddhi taluks and the Nagavalli and other streams in the Parvatipur, Bobbili and Palakonda taluks afford such favourable conditions, which account for the larger areas under the crop in those taluks. In the Palakonda, Parvatipur and Bobbili taluks, timely and heavier rainfall is also partly responsible for the larger areas under this crop. In the southern taluks the better drainage and underground water-supply in the sugar-cane growing areas favour not only the cultivation of this crop on a larger percentage of the area under paddy (6.9% against 3.8% in the northern taluks), but are also responsible for the higher standard of cultivation and the resultant comparatively higher yields. Besides the above soil and climatic conditions, the area under sugar-cane cultivation is influenced to some extent by the industry of the agricultural communities inhabiting the tract. Wherever the Gavaras are the predominating agricultural community as in the southern taluks, sugar-cane is largely grown and its standard

of cultivation is also high. The recent introduction of new varieties of sugar-cane such as J. 247 and Co. 213 (the latter of which can be planted with a single irrigation or with the help of a heavy rain and thereafter grown successfully without any further irrigation or elaborate propping or wrapping) has also influenced and is likely to influence the areas under this crop especially where it is now grown on very small areas as in the Vizagapatam, Vizianagaram and Srungavarapukota Taluks.

Having dealt with the six main crops it may not be out of place to make a passing reference to a few other crops whose distribution also calls for some comment.

Jonna (Andropogon Sorghum) as a regular crop is confined to the black soil areas of a few taluks, Golugonda, Vizianagaram, Salur and Bobbili, occupying about 75 thousand acres on the whole. It is also grown on some hill-slopes under what is known as "Podu" system. The black soil crop is of a shorter duration and is sown in September-October, while the Podu varieties are of a longer duration and are sown in June. Both flower at the end of the rainy season, this being an essential factor for a good yield. Jonna is also sometimes grown in the lighter soils, but chiefly in paddy lands, when it is not found possible to grow paddy for want of rain or water. In such years the areas under Jonna swell up.

The cultivation of *Gogu* (Hibiscus cannabinus) is practically confined to the northern taluks (excluding Salur) which answer for 25,000 acres out of a total acreage of about 26,000 acres in fasli 1342. Why this crop should be so almost entirely confined to the northern taluks is not clear. The proximity of the Jute Mill at Chittivalasa at the entrance to the port of Bimilipatam, from which the fibre and gunnies made of it were largely being exported, might have been a chief factor in the development of the cultivation of this crop in the northern taluks. Soil and climatic conditions do not appear to be responsible for the almost entire elimination of the crop from the southern taluks.

Chillie is the chief condiment grown in the district, and occupied about 35,000 acres in fasli 1342. Of this area the Vizianagaram Taluk alone accounts for about 20,000 acres; the light red soils of this taluk with numerous wells probably facilitate the cultivation of this crop there. Like Jonna it also sometimes takes the place of paddy in years of drought.

Tobacco is fairly well-distributed over the whole district occupying about 50,000 acres in fasli 1342. The largest area is

found in the Rayagada taluk which had about 13,000 acres in the same fasli. I have not visited this taluk. Perhaps the rich virgin soil said to be available there accounts for its large production.

The explanations attempted to be given for the variation in the areas of the above crops in the different taluks, are based on observations made in the course of my tours. Students of Geography may in their holidays take up the study of this subject on a more satisfactory basis and throw more light on the causes of the variations.

Before concluding I should like to briefly discuss the effect of the variations in the distribution of the crops on the economic condition of the ryot. I am not much acquainted with the agency tracts and shall leave this area out of consideration. In the plains the economic condition of the ryot depends upon two factors. One is his capacity to produce the food and fodder he and his cattle require. The other is his capacity to produce such articles as would by their sale procure him the cash required for his cultivation expenses, assessment or rent on the land and his domestic cash expenditure. In this district, on the whole, the ryot's system of cropping enables him to obtain both the food and cash requirements unless the holding is too small or the season very unfavourable. The food crops grown being a common factor in the northern as well as southern taluks, it is the money crops that chiefly contribute to any differences in the economic condition of the ryots in the two tracts. Of the money crops sugar-cane appears to be the most advantageous, as it affords scope for the utilisation of the family labour throughout the year without demanding extra labour on any large scale and brings on a larger net income per acre than any other crop. The crop thus enables even ryots with small holdings to command the cash they require. Gingelly, though an uncertain crop, is very easily grown; and even if it fails, the value of the seed is small. It is not the sole crop in the year, preceding a cereal in dry lands and preceding or following paddy in wet lands. For both Gingelly and Jaggery there is a large local demand whatever the price may be. Groundnut, which is mostly an export crop is a source of considerable profit when it commands a good price and so long as there is demand. Its introduction about thirty years ago and its extension to over a lakh and a quarter acres since then were largely responsible for the prosperity of the ryots of the northern taluks who took to it. When the prices go down and the demand is not brisk, however, as in the past few years, this crop does not fit in so well into the eco-

nomics of the ryot as gingelly on account of its higher cost of cultivation and seed rate and its being the main crop for the year. Gogu is even worse in this respect and its cultivators in the northern taluks have been, of late, suffering from the slump in its price and want of demand, the produce not fetching even the cost of extraction in some cases. On the whole the fortunes of the ryots of the southern taluks who depend on sugar-cane and gingelly have been more steady than those of the northern taluks who depend upon groundnut and gogu as their money crops; and the better soil and the more intensive cultivation practised in the case of sugar-cane made the ryot of the southern taluks economically better off in general than his brother in the northern taluks.

Statement showing the areas of six principal crops and the distribution of rainfall in the plains separately for the six northern and the six southern taluks.

No.	Taluk		Paddy	Chodi	Ganti	Gingelly	Groundnut	Sugarcane	Rainfall (average of 40 years) Feb. to May.	June. to Sept.	Oct. to Jan.	Total.	Rain-fall April. May. & June.
1.	Golugonda	..	35123	11419	32933	23701	37	1477	6.76	24.86	10.93	42.55	10.26
2.	Sarvasiddhi	..	52757	14777	34337	20687	61	753	4.10	21.38	11.67	37.15	7.25
3.	Viravilli	..	43000	15625	21471	12881	1437	9688	5.79	25.48	12.12	43.39	10.34
4.	Anakapalli	..	29898	16110	33791	7396	1312	2303	3.72	21.10	11.11	36.53	7.21
5.	Vizagapatam	..	12000	7653	23000	2194	6620	110	4.04	19.97	14.79	38.80	6.91
6.	Srungavarapukota	..	37374	9255	8075	6885	11404	233	6.31	27.75	8.56	42.62	9.99
			210162	74839	153607	73744	20871	14584	5.12	23.52	11.31	40.51	8.66
1.	Vizianagaram	..	64702	45190	27919	6122	26977	543	5.02	25.02	11.86	41.92	8.40
2.	Chipurupalli	..	25200	21840	15863	6335	26280	128	3.83	25.34	10.80	39.97	7.80
3.	Palakonda	..	95900	18928	861	6242	19896	2368	5.88	32.60	7.72	46.20	10.11
4.	Bobbili	..	53460	18813	1270	16183	15362	2865	5.64	28.06	7.11	40.81	9.62
5.	Salur	..	13991	12250	3770	2463	3332	670	5.68	27.28	10.39	43.35	9.92
6.	Parvatipur	..	34746	6295	770	7968	3194	4438	6.67	30.90	8.37	45.94	10.79
			287999	123316	50453	45313	95012	11012	5.45	28.20	9.38	43.03	9.44

Statement showing the areas of the six principal crops and the distribution of Rainfall in the Agency tracts.

No.	Taluk	Paddy	Chodi	Ganti	Gingelly	Groundnut	Sugarcane	Rainfall, average for 40 years. Feb. to March.	Jan. to Sept.	Oct. to Jan.	Total.
1.	Pottangi ..	55,000	1,10,050	—	—	—	400	7.94	44.43	8.68	61.05
2.	Padwa ..	8,000	1,30,000	—	—	10	200	8.99	40.54	5.85	55.38
3.	Naurangapur ..	2,27,000	2,000	—	200	—	2,400	4.44	55.36	3.91	63.71
4.	Jeypore ..	1,60,200	19,300	—	990	180	3,110	4.99	65.06	4.92	74.97
5.	Others ..	68,214	48,147	5,516	14,839	1,835	2,130				
	Average for the Agency Taluks.							6.25	43.90	6.08	56.23

The Earth: Its Evolution and Structure*

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THE ORIGIN OF THE EARTH

According to the astronomers, about 3600 million years ago, a passing star by its tidal action tore off small fragments from the sun, which formed the planets of which the earth is one. We mark this as the time of planetary and lunar growth.

THE AGE OF THE EARTH

The element uranium is spontaneously disintegrating into helium and lead. This process has remained uniform throughout geological time, independent of temperature, pressure and other external conditions, as it is the nucleus that is involved in the decay. As we know the rate of this disintegration process, a measurement of the quantity of uranium and lead in a rock will give its age. From this uranium decay, physicists estimate the age of the earth to be nearly 3600 million years.

EVOLUTION

A careful study of the markings and the fossils in the rocks has revealed to us the past history of the earth's life. The molten earth gradually cooled in course of time with the formation of a crust, the atmosphere and water. The primordial ocean slowly acquired the various mineral salts from the rocks, thus building up the inorganic environment for life. The ten essential elements, Hydrogen, Oxygen, Nitrogen, Carbon, Phosphorus, Sulphur, Potassium, Calcium, Magnesium and Iron are present in all living organisms forming inorganic compounds in colloidal suspension. The inorganic cell, through energy received from the sun, developed

* Summary of a paper read before the Coimbatore branch of the Madras Geographical Association.

certain chemical agents known as enzymes which brought about chemical co-ordination. Thus the cell became alive and capable of developing its organic plasma from the inorganic elements of its environment. And by a slow process of evolution through millions of years, life has developed from the unicellular to the multicellular, from the lower to the higher organisms. But this evolutionary process had never been uniform due to the great changes in the earth's climate, as a result of the changing shape of the earth's orbit, the gradual shifting of the poles of rotation and fluctuations in the heat of the sun itself.

THE GEOLOGICAL ERAS

The life history of the earth begins with the Azoic era which covered a vast period of 2100 million years. The earth's molten exterior solidified and an atmosphere rich in carbon-dioxide was formed. Evolution was confined entirely to the mineral kingdom. During the next epoch, the Archæozoic, unicellular organisms namely the amœba and the protococcus made their appearance. The cell wall of the amœba is nitrogenous, whereas that of the protococcus is of cellulose, thus indicating that the amœba is the starting point of the animal kingdom and the protococcus that of the plant kingdom. The Archæozoic era covered nearly a period of 575 million years. During the next era, the Proterozoic which lasted for 375 million years, the unicellular organisms instead of separating after division, clung together. Thus the protozoa became the metazoa or the many-celled organisms.

The Palæozoic era began about 550 million years ago and covered a period of 360 million years. It is divided into seven periods. The first of these is the Cambrian. During this time most of the land areas were north of the equator. There were two large continents and three smaller ones. The one that corresponded to North America was Laurentia. It was largely polar. The great southern continent of Gondwana occupied a large part of South America and extended across the Atlantic including Africa and a part of Europe and Asia. Cascadia extended from what is now Eastern Asia to Alaska and south along the western part of the United States. Lemuria included Japan, East Indies and Australia. Archinotis was an Antarctic continent. During the second period, the Ordovican, the climate was warm throughout the world and evolution proceeded rapidly. The Silurian period was ushered in by a frequent rise and fall of continents due to the movements of the

earth's crust. During the Devonian period, the outlines of the continents were greatly changed. Laurentia had shrunk and connected Greenland with Northern Europe. The larger part of North America was included in Cascadia, which extended across the Northern Pacific, covering a major portion of Asia and curving southward to include Australasia. The whole formed the great continent of Lemuria. The third and last continent Gondwana included Archinotis in the far south, the present continent of South America, a broad land bridge across the Atlantic, Africa and India. During this time land plants became abundant and fish, probably the first vertebrates, swarmed the seas. Naturalists are of opinion that the backbone has developed from a structure known as the notochord running along the back of creatures like the acorn-worm and the sea-squirt, which are probably the only surviving representatives of the many ancestral forms from which fish may have arisen. The last three periods of the Palæozoic era, the Missisipian, the Pensylvanian and the Permian are grouped together under the general name of 'the Carboniferous age', due to the formation of coal during this time. The end of the Palæozoic era was marked by great upheavals of nature. The climate began to grow cold and snow fell where tropical conditions had prevailed for millions of years.

The Mesozoic era of the Age of Reptiles began 190 million years ago and is divided into four periods. In the first period, the Triassic, the climate was dry throughout the world. Vegetation was stunted due to the adverse conditions under which it suffered. During the Jurassic period there was a rapid development of seed-bearing trees. In the animal kingdom, new creatures called the reptiles made their appearance for the first time. Some of these reptiles called dinosaurs had attained very huge sizes. From the reconstructed fossil remains we find that some of these beasts were more than 100 feet from snout to tail. These gigantic creatures would have presented a very strange and bizarre appearance to our eyes. At the end of the Jurassic age the extreme cold completely wiped out these giant reptiles and they thus became extinct.

A group of small hopping reptiles, driven by competition, went up the higher hills. To protect themselves from the cold they developed feathers. These were the first birds. The fossil remains of the bird Archæopteryx show that it had reptilian teeth in its jaws and a long reptilian tail. The earliest mammals like the ear-

liest birds were creatures driven by competition into a life of hardship and adaptation to cold. Instead of feathers, they developed a thick hairy skin. The primitive bird Kiwi of New Zealand is perhaps a connecting link between the reptile and the bird, so also the duck-billed Platypus of Australia, perhaps a connecting link between the reptile and the mammal.

The last period of the Mesozoic era, the Cretaceous, was marked by the subsidence of North America. Australia and South America were largely under water. This was a very quiet period. But the end of the era was marked by the greatest series of volcanic eruptions in the earth's history and these took place largely in Asia.

We pass on to the last era, the Cenozoic or the era of mammals which began 55 million years back, a very short time when compared with the vast ages which we have passed under review. It is divided into five periods, the Eocene, the Oligocene, the Miocene, the Pliocene and the Pleistocene. The Eocene period was one of mammalian advance, especially of the earlier forms of the horse, the elephant and the rhinoceros. The Miocene age was one of very violent volcanic outbursts and considerable changes in the earth's crust. The climate was warm even in the Arctic regions. There was a luxuriant growth of grasses necessary for mammalian evolution. In the animal kingdom, the lemurs and the apes had made their appearance. It was during the later half of this period that the Himalayan range was thrown up. The Pliocene and the Pleistocene were periods of great continental elevation. During the end of the Pleistocene period there was a steady lowering of temperature all over the world which resulted in glaciation. The outlines of the present continental areas were probably firmly established during the later half of the Cenozoic era.

APE-MEN AND TRUE-MEN

Naturalists divide the class of mammalia into a number of orders and at the head of these is the order of Primates which includes the lemurs, the monkeys, the apes and men. It is very difficult to decipher the past history of the Primates in the geological record, as their remains are rarely covered up by sediment. The crude flint implements of the Pleistocene age found in some parts of the world are the most ancient authentic evidence of man. These flint implements are called Eoliths or dawn stones. In a million

year old deposit at Trinil in Java, discovered by Dubois in 1891, was found a piece of skull and bones of a sort of apeman with a brain case bigger than that of any living apes. He seems to have walked erect and hence he is called Pithecanthropus Erectus or the Java Apeman. In a sand pit at Heidelberg which is supposed to be a quarter million years old, was found a quasi-human jaw bone of probably a human monster, who might have fought with the mammoth and the sabre-toothed tiger. The past history of this creature is quite enigmatical. The remains of a thick sub-human skull and bone implements estimated to be hundred years old were found at Piltdown in Sussex. This creature is called the Eoanthropus or the dawn man. The discovery of the remains of the Sinanthropus or the Peking man in Central Asia is a recent one. But none of these above-mentioned seems to be the direct ancestor of man.

The discovery of some quasi-human bones at Neanderthal prove the existence 50 thousand years back of a sort of apeman, the Neanderthaler. In a cave at Cro-Magnon a number of skeletons have been found which prove to be the earliest true-human remains. We call these the Homo-Sapiens or the first true men. A discovery in 1921 in South Africa proved to be the relic of a third sort of man, called the Rhodesian man, intermediate in its characteristics between the Neanderthaler and the Homo-Sapiens. The bones, weapons and rock carvings dating back to 30,000 years found in France and Spain belong to the first true men. There have been no finds of the higher primates in America and we presume that this development of life was almost exclusively an Old-World phenomenon.

Tracing the pedigree of man, naturalists have come to the conclusion that he has evolved from an ape-like ancestor. The human embryo seven weeks old has a tail and the remains of a muscle, the Agitator Caudae that once moved it about. Nothing else shows more clearly that man has come from a tailed ancestor. Infants bend their feet inwards, so that the soles in a great measure face one another. We find the same among the simians in whom the feet are turned inwards to help them to grasp the branches. The Darwin's point in the human beings, which is more in evidence at birth than in later life, is a relic of the turned over pointed tip of the ear of the common ancestor of the man and the ape. Prof. Elliot Smith says: "No structure found in the brain of an ape is lacking in the human brain; and on the other hand the human brain

reveals no formation of any sort that is not present in the brain of the gorilla or the chimpanzee. The only distinctive feature of the human brain is a quantitative one. Not only man's brain, but his bones, muscles, nerves and blood vessels—in fact all his organs—are almost exact replicas of the corresponding parts in the apes."

EMBRYOLOGY

Almost all the animals including man in their embryonic stages bear a striking resemblance to one another. And in the development of the embryo during the prenatal life we actually witness the wonderful process of evolution. In the words of the biologist, 'Ontogeny' or the development of the individual is a recapitulation of 'phylogeny' or the history of the species. Dr. Saleeby says, 'Had we seen for ourselves the aeonian evolution of man from the primitive slime, but never witnessed the relatively instantaneous development of a man from a human germ, we might well account the latter impossible. But having seen the greater marvel we cannot call the lesser incredible.'

Eras	Organisms	Time in million years	Our scale m—d—h
Azoic	Lifeless	2100	7 — —
Archæozoic	Unicellular	575	1 28 —
Proterozoic	Invertebrates	375	1 7 —
Palæozoic	Amphibians Fish	360	1 6 —
Mesozoic	Reptiles, Birds	135	— 13 12
Cenozoic	Mammals	55	— 5 12
	Man	1	— — 2.4

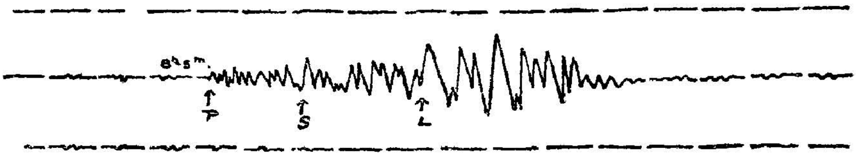
INTERNAL STRUCTURE OF THE EARTH

So far we have made a brief survey of the external features of the earth. We shall now probe deeper into the earth and have a view of its internal structure as revealed by modern seismology. For us, an earthquake is a rare phenomenon of passing interest; for the Japanese, it is a dreaded horror. An earthquake is a re-

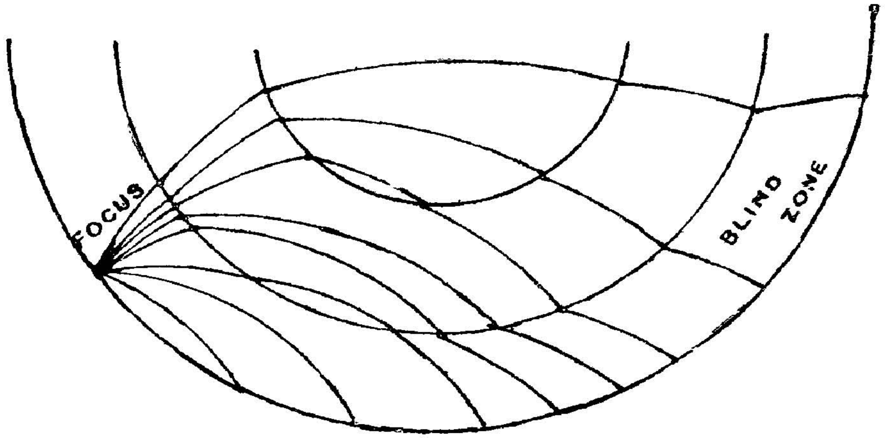
lease of energy from inside the earth, generally caused by either volcanic activity or sudden changes in the earth's crust. The earthquake shocks, after traversing the earth for various distances and along various paths, are finally recorded on the seismographs set up at various stations on the earth. The nature of the records indicates the paths by which the signals reached the instrument and the properties of the materials through which they passed.

Earthquakes are supposed to originate at depths of 25 miles or less. In every earthquake there are three distinct types of waves, which arrive in the same order always. These are (1) the longitudinal or P waves—waves of compression and rarefaction, (2) the transverse or S waves—waves of distortion, and (3) the surface or L waves which are both longitudinal and transverse. These waves are shown in the seismogram reproduced.

A SEISMOGRAM



The earth has a spherically layered structure, consisting of a central core surrounded by a series of shells of different thickness, each with its own distinct properties. The spherical surfaces separating the various shells are known as surfaces of discontinuity, as the transition from one layer to another is relatively sudden. The surface of discontinuity surrounding the central core is about 1800 miles below the surface of the earth. The central core is supposed to be made up of iron and some nickel. Here we have a large part of the extra density to make up for the light surface rocks and average up the earth's density to 5.6 as determined by the physicists. It is supposed that the central core though dense under high pressure is not an elastic solid. The S waves which will not be transmitted through a liquid or gas do not traverse the central core. The P waves are refracted at the surface of discontinuity in such a way, that they fail to reach stations which are between 7,000 miles and 1,000 miles of the epicentre, leaving a blind zone as shown in the figure. The velocity of the P wave is about 8 miles per second just outside the central core, but within the core it drops suddenly to 5.3 miles per second, as deduced mathematically from the earthquake records.



Surrounding the central core, there are three layers of slightly different properties. The discontinuity at the outer border of the triple layer is at a depth of 750 miles. The material composing these three layers is silicon with a little iron. The three layers together constitute what is known as the transition layer. The upper boundary of the next layer, made up of silica and magnesium, is at a depth of nearly 40 miles. According to Prof. Jeffreys, the outer crust is composed of three layers, separated by discontinuities at depths of 7½ and 23 miles. These he terms in order descending, the granitic layer, the basaltic layer, and the ultrabasic layer, thus indicating the probable nature of their constituent rocks. It is supposed that the inner 20 miles thickness consists of igneous rock forming materials existing at temperatures which vary outwardly from about 2000°C to something approaching atmospheric temperatures and having a structure varying from that of a semi-molten mass to that of the crystalline igneous rocks exposed on the earth's surface. The outer 20 miles thickness consists mainly of irregularly distributed stratified and igneous rock formations. The igneous rocks which make up so large a portion of the earth's crust come under two groups: (a) the granitic group, which consists of the lighter and more infusible rocks and (b) the basaltic group which consists of the heavier and more fusible rocks. The stratified rocks, though they have been derived from the igneous rocks and have nearly the same chemical composition, yet they differ from them very much in physical structure and individual chemical composition. They are divided into two classes: (1) the siliceous and (2) the calcareous. The siliceous rocks are composed of sands, mud and other mineral matter which have become stratified due to gravitational pressure, hydration and other

such influences. The calcareous rocks have been produced from the shells and other remains of marine organisms, which under the same influences as above, have been transformed into the limestone formations. While the average chemical composition of the stratified rocks closely approaches that of the earth's crust, their individual composition varies from the nearly pure silica of some of the quartzites and sandstones to the nearly pure carbonates of magnesium and calcium of some of the dolomites, and the nearly pure calcium carbonate of some of the limestones.

An analysis of the earth's crust gives the following percentage average chemical composition:

Silica 59.87	Magnesium Oxide 4.06.	
Alumina 15.02	Calcium Oxide 4.79	
Ferric Oxide 2.58	Sodium Oxide 3.39	Titanium Oxide 0.72
Ferrous Oxide 3.40	Potassium Oxide 2.93	Other Oxides 3.24

THE SEISMOGRAPH

The instrument called the seismograph records the movements of the earth. Fundamentally the seismograph is a pendulum, but the motion is reversed. The heavy mass of the pendulum remains stationary while the earth swings. And so, any motion of the earth's surface is recorded. If the instrument is properly damped to prevent the pendulum from swinging in its natural period after it receives an impulse, then the true earth movement can be determined from the resulting seismogram.

The best types of seismograph are photographic. The horizontal instrument records the motion of the earth parallel to the surface. Divested of all its appliances for reducing friction, providing amplification and modifying the amplitudes, the apparatus is a simple horizontal pendulum; to this is attached a small concave mirror. Several feet away are a recording drum and a lamp. The drum is covered by a photographic sheet. Light is projected from a slit in the lamp to the mirror of the seismograph, which reflects the rays into a horizontal slit on the box covering the drum. Behind the slit is a cylindrical lens to converge the rays to a point of light. The drum rotates once every hour and at the same time moves about one-quarter of an inch to the right, so that the point of light traces out a continuous line forming a helix. When the sheet is removed and developed, the record appears as a series of

parallel lines, each line representing a period of one hour. There are short breaks in these lines which are the minute signals. During the end of each minute, by magnetic means, the light is shut off from the lamp so that there is no record for that second. Hence the time of an earthquake can be accurately found from the seismogram.

The vertical seismograph depends on the inertia of a heavy mass supported by a spring. It records the up and down movements of the earth. The vertical displacement is transformed into a horizontal one by a system of levers and is recorded on a sheet of smoked paper. The latter is mounted on a drum which rotates like that of the horizontal instrument, producing a record similar to the same. At the end of every minute the pen is raised off the smoked sheet.

It has been found that the time between the arrival of the P and S waves always bears a fixed relation to the distance of the seismograph from the eipcentre and also to the time of transmission of the shock from the origin. Tables have been constructed from which this distance and time of origin can be determined when the difference of time between P and S is known. The distances from each of three or more stations being known, for any given earthquake, the position of the epicentre (that points on the surface vertically above the focus) can be determined very accurately.

PRACTICAL APPLICATIONS

The one important application of seismology is in prospecting. The existence of oils and minerals is revealed by the seismic records. At times we find minute, regular vibrations in the seismograms, which are not caused by earthquakes. These are called microseisms. Dr. S. K. Banerji has recently discovered two definite types of microseisms in the seismograms in our country, one caused by the monsoons and the other by the storms in the Indian seas. As these microseisms appear in advance, the advent of the monsoons and the storms can be predicted beforehand.

CONCLUSION

We had a rapid journey into the past through the 'dim labyrinthine corridors of time', like Mr. H. G. Wells' Time-Traveller.

We have witnessed vast periods of time during which continents have risen and sunk. We have also witnessed the growth of life through gulfs of time from a mere stirring in the primitive slime towards freedom, power and consciousness. Humanity has appeared in this world only a little while ago, and it has a great future before it.

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Dr. Fermor's Address on Causes of the Recent Earthquake

The causes of the recent earthquake were fully gone into by the Conference of Geological Experts which met under the joint auspices of the Geological Survey, the Geological and Metallurgical Society of India and the Calcutta Geographical Society. Dr. L. L. Fermor, Director of the Geological Survey of India, was voted to the chair.

Dr. Fermor, in the course of his Presidential address, observed that on the date of the occurrence of the earthquake, although he was in the heart of Calcutta, he did not feel the shock. He referred at length to the investigations which were being carried on by his department in different parts of Bihar for ascertaining the causes and effects of the earthquake. The President declared that, in his office-room, he had a map of India on which he had regularly marked the intensity of the earthquake shock at different places as reported in newspapers. His method consisted in marking different places with different colours according to the intensity of the shocks. This map of his helped him to deduce that the most violent effects of the earthquake were felt along the strip of country extending from Darjeeling to Motihari and another strip at an angle to it from Motihari to Monghyr.

Continuing, Dr. Fermor referred to the questionnaire sent out by his department for being filled up by witnesses in the various provinces. The President found therefrom that there were some very unusual features. He was therefore issuing a revised questionnaire so as to include details regarding the appearance of fissures on grounds and other damages to the surface of the earth. He announced that an officer of his department had been deputed to examine the southern parts of Nepal.

Dr. M. Chatterjee, Professor of Geology at the Calcutta Presidency College, declared that he felt two distinct shocks with a slight lull between them on the 15th January. He was inclined to locate the epicentral area along the southern border of Nepal.

Mr. T. K. Nair, Mettallurgical Inspector, Jamalpur, then related his experiences. He stated that houses built in rocky areas and on

rocky foundations were able to withstand the earthquake shock much better than those situated on or near the banks of the Ganges.

A VERY COMPLEX ONE

Mr. D. N. Wadia, just returned from an official tour of inspection round Darjeeling, told the Conference that in his opinion the recent earthquake was a very complex one. The movement along the main boundary fault separating the Himalayan region from the Gangetic alluvium was, according to him, the probable cause. It appeared to him from his investigations that there were also some connected faults probably underneath the alluvium, along which minor dislocations might have taken place. It struck Mr. Wadia as premature to hazard any opinion until the epicentre was definitely ascertained. Continuing, Mr. Wadia averred that compared with the Assam earthquake of 1897, the present earthquake "must be considered mild". But the epicentral tract in the present instance appeared to be much larger. Mr. Wadia proceeding, remarked that the intensity of the shock at Darjeeling was not more than eight on the Rossi-Foral scale and at Monghyr and Purnea not more than nine, notwithstanding the wide area of devastation and destruction. The structures at Darjeeling said Mr. Wadia, had very bad foundations on loose sub-soil, liable to slipping, and were also too heavy, besides being badly constructed. He considered that Monghyr houses needed no more than a mild shock to demolish them. There was another circumstance also, namely, that Monghyr was situated on the fringe of the Gangetic alluvium and solid rocks. Due to the reflection of earthquake waves from this junction and their interference with the incoming waves, the intensity of the shock seemed to have been augmented in the vicinity of this junction. At Purnea, he found most of the buildings still standing up although the ground had been extensively fissured. The Collector of Purnea had told the speaker that a long time before the actual earthquake, Purnea heard terrible sounds resembling gunshots. These sounds ceased to be heard after the earthquake.

Mr. S. L. Biswas explained the reason for the dislocation along the Himalayan foot-hills on the principles of Isostasy according to which the Himalayas were supposed to be more or less a floating mass and any transference of heavy material from it to the adjoining alluvium tended to buoy up the Himalayas still further and correspondingly push down the alluvium. Thus at the junction of the two areas there was a relative movement at some depth below

the surface of the earth along a fault plane, thereby causing an earthquake.

Dr. M. S. Krishnan, of the Geological Survey, who guided the proceedings during the latter part in the unavoidable absence of Dr. Fermor, summing up the discussion, emphasised the importance of the part played by the main boundary fault in the causation of earthquake. Extensive fissures of ground in the northern parts of Muzafferpore and Darbangha immediately adjoining the Nepal boundary pointed to that region being the epicentre of the recent earthquake. Further observations especially from Southern Nepal were likely to throw light on the exact location of the epicentre.

Dr. Krishnan opined as likely the existence of sympathetic faults in the trough of the Gangetic alluvium, along which also dislocations were likely. He further pointed out that since alluvium was a heterogeneous mass, " external effects observed do not supply reliable criterion for the actual intensity of the shock at places."

A vote of thanks to the chair concluded the proceedings.

News and Notes

With this number commences the ninth volume of the Journal. We take this opportunity of thanking those who have been supporting us all these eight years, showing appreciation of our endeavours. As a result of such help, it was found possible to increase the original size of the journal by more than double and introduce improvements such as linotype printing, etc. But our finance are not satisfactory yet; and we appeal for fresh enlistment of members—both journal and non-journal. It is hoped that existing members will also help in this direction.

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In spite of the efforts of various agencies and authorities all the long years, the elementary schools and the lower classes of secondary schools have not been touched at all by the new ideas about geography and the teaching of the subject. Not only has the foundation of geographical knowledge for the higher school thereby weakened a good deal but also thousands of pupils whose only chance of obtaining geographical ideas is in the elementary school only now go without a proper knowledge or training in the subject.

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The best way of changing this undesirable state of affairs is by manning the elementary training schools with teachers who have had a training in the modern methods of handling the subject. If that is not possible, the next best thing that may be suggested is *a vacation course in Geography* for the teachers of the several training schools. It is hoped that the Department of Education would be able to find the finance for it and arrange to organise the same as early as possible.

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Meantime, the local authorities and the inspecting staff can arrange for *Refresher Courses* for teachers of elementary schools within their jurisdiction. Such a course was arranged during the first week of May at Bhavani by the Deputy Inspector of Schools Erode Range for the benefit of the teachers of elementary schools in Bhavani Taluq, who were collected together and given about a week's course in some of the school subjects including Geography. The last was done by the Secretary of the Association.

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But the teaching in the first three forms of secondary schools is in no way better; and all the recent efforts for reform in geography teaching have been directed towards the improvement of the high school teacher only, so that they have not produced any appreciable results in the middle school. It is still the plethora of fact lore that is dumped on the poor innocents without any attempt at giving the outlook or the training or the foundation. It is hoped that the syllabus and the suggestions which are now on the anvil will, when published, go some way towards improving conditions. But the more important lever for improving conditions here also is to give special training to the teacher in this direction. Hence it has been decided that the Summer Schools and Refresher Courses in Geography conducted by the Association should for some time be preferably for the middle school teachers rather than for the high school teachers.

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Things have been rapidly changing in the High School. Before the remodelled S. S. L. C. Scheme had been in force for a couple of years or so, it has again been changed, affecting the position and importance of Geography to a considerable extent. Theoretically no doubt Geography enjoys in the new scheme the same place that is accorded to History, Science or any other long established subject of the high school curriculum except of course Mathematics and the Languages. But owing to the fact that Geography has not been provided for in the intermediate course in any men's college and only in one woman's college, and owing to the need for equipment in Geography more than in History or Language (the other two alternative subjects in the same group), very few schools are likely to provide for the teaching of Geography as a C-Group subject. The net result will be the practical exclusion of Geography from the higher classes of the high school—a strange reaction not contemplated or anticipated when the new scheme was ushered in. The last geography for most pupils will consequently be what they learn in the IVth form. It is for educationists to consider whether a subject like Geography, which is of such high value for citizenship and discipline, should thus be practically excluded from the higher classes of the high school. Our experience regarding the teaching of B-Group subjects has been sad. It is hoped that Geography in Form IV may not share the same fate as before.

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When five colleges were compelled by the University to give up the teaching of Geography in the Intermediate classes, it was

on the score that the staff was unqualified. The University set to work immediately, and started the Diploma Course in Geography to supply the qualified teacher for school and college. People with Honours Degrees in allied subjects and with Diploma in Geography have now been available, but no institution has ventured to start the course again. It is highly desirable that, if no private college will do it, the Government at least should try to fill up the gap by opening the subject at the intermediate stage in the several Government Colleges in the Presidency.

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In the Queen Mary's College, Intermediate Geography has been in existence for sufficient time; and with the fully qualified staff that the institution is lucky enough to possess, it is high time that the Degree Course in Geography should be instituted as early as possible. Otherwise, the Intermediate Geography there is a blind alley. It is hoped that the college authorities would move in the matter, and that the Government would be willing to find the funds needed for the purpose.

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There was no Summer School in Geography conducted by the Association during April or May last as in previous years. But it is decided to have a Refresher Course in Geography either during the Michaelmas or Christmas holidays. In view of the fact that reform in the teaching of Geography in the first three forms is badly and urgently needed, it is proposed to confine the course to middle school teachers only.

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The next (fifth) conference of the Association will be held at Anantapur, as usual along with the S. I. T. U. Conference, during the coming Christmas week, when original papers on various aspects of the Geography of the district will be read by specialists, each in his own subject. Excursions will also be arranged at the time to places of geographical interest in the neighbourhood.

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There will also be a major excursion during the Michaelmas holidays as in the last year. The exact details of time, place, cost etc., will be notified in due course. Members likely to join it may inform the Secretary about it sufficiently early, so that the approximate numbers of the party may be known previously.

Reviews

Practical Map Books: By S. J. B. Whybrow. Book I: Great Britain and Ireland; Book 2: Europe. Price 10d. each. (J. M. Dent & Sons, Ltd., London).

These are the first two books of a series of Practical Map Books, which are intended to supplement the text-book and the atlas rather than to take their place. The working out of the given exercises on the blank maps is calculated to ensure a knowledge of topographical accuracy, besides helping the study of familiar material from fresh points of view. Starting with a study of physical features and climate, the exercises carry the student through the different regions of Great Britain and Ireland in the one volume as of Europe in the other, and then finish up with a study of density of population and railways and trade. The use of these books will prevent parroting in the study of Geography since the facts will be fixed in the mind as the exercises are worked out.

W. and A. K. Johnston's Geographical Pictures: Set I. Cool Temperate Lands. (W. & A. K. Johnston, Limited, Edinburgh & London).

The teaching of Geography has suffered in the past not only by memoriter work taking the place of practical work but also by the want of adequate stimulus to the imagination in the shape of good typical geographical features. Things have improved considerably nowadays; and enterprising geographical publishers like Messrs. Johnston have been trying to fill a gap.

The pictures under review form the first set of a useful series, and consist of a dozen representative pictures depicting the most important aspects of life and work of man in the Cool Temperate Lands all over the globe—in both the Northern and the Southern Continents. The Douglas Firs of British Columbia, a Log Jam in Canada, a Steam Log Hauler in a Tasmanian Forest, a Corner of the Fox Fur Auction in Moscow, Strawberry-gathering in British Columbia, Apple Orchards in Tasmania, Cattle rounding up at a New Zealand ford, Sheep-farming in Patagonia, Electric Sheep-

shearing in New Zealand, Tractor and Multiple-plough in the Canadian Prairies, A Steam Threshing Machine in the Ukraine, Hoeing a Beet Field in Germany—all these present a rich variety and comprehensiveness of man's work in distant lands. The prints are of fairly big size, clear, expressive and attractive; and their value is considerably enhanced by the descriptive letterpress given under each picture. We have no hesitation in recommending their general use in schools to make the teaching of Geography realistic and effective.

The Geography of India Through Maps: By Phyllis Seymour Darling, M.R.S.T. English and Tamil editions. Price As. 6. (Christian Literature Society for India, Madras)

The English edition of this useful little book was reviewed in a back number (Volume VIII, No. 1) of this Journal, from which we freely quote below:—"This is a companion volume of practical work to Miss Birdseye's *Our Country*. It has been prepared with the threefold purpose of (1) making the pupils appreciate the significance of geographical facts by working at given data; (2) giving the pupils training in map-work as the basis for future geographical study; and (3) affording a sound knowledge of the geography of their mother land. The book can also be used, where modern methods of individual work are practised. An important feature of the book is the detachability of the maps, which makes map correlation easy and convenient. The outcome of the use of the book will be to supply the pupils with text-books, containing records of their own work. We would strongly recommend the adaptation of it into the South Indian vernaculars, if it is to come into general use." We are glad to note that our suggestion has been acted upon, and a Tamil edition of it has been produced, which we are sure will be used in all Tamil schools.

Bulletin of the Madras Government Museum—Tiruparuttikunram and its Temples: By T. N. Ramachandran, M.A. (Superintendent, Government Press, Madras), Price Rs. 11-4.

This is a detailed and comprehensive study of two Jain temples on the outskirts of Conjeeveram, the great city of Tondaimandalam through the ages, Madras taking its place only in quite

modern times. From one point of view, the history of Conjeeveram is practically the history of religion, art, architecture and culture in South India. Of the two temples, the smaller is in late Pallava style, and the larger early Chola with a mandapa in Vijianagara style. " They thus supply an epitome of the main features of the chronological development of Dravidian temple architecture which so far as is known is found nowhere else in so concise and well-balanced a form." After a detailed consideration of the several parts of the two temples, Mr. Ramachandran has discussed the inscriptions and paintings in them, and has added three valuable appendices on Jain units of measurement and time, cosmology and classification of souls. The volume is quite a scholarly work and is the outcome of considerable research.

Books and Journals Received

Practical Map Books: By S. J. B. Whybrow. Books 1 and 2. (J. M. Dent & Sons, Ltd., London).

W. & A. K. Johnston's Geographical Pictures: Set. I. Cool Temperate Lands. (W. & A. K. Johnston, Limited, Edinburgh & London).

Geography of India Through Maps: By Phyllis Seymour Darling. Tamil and English editions. (Christian Literature Society for India, Madras).

Bulletin of the Madras Government Museum—Tiruparuttikunram and its Temples: By T. N. Ramachandran. (Superintendent, Government Press, Madras).

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The South Indian Teacher—February, March and April 1934.

The Gardening Review—February, March and April 1934.

Quarterly Journal of the Mythic Society—January and April 1934.

Geography—March 1934.

Journal of the Travancore Teachers' Association—February 1934.

The Indian Educator—February, March and April 1934.

The Presidency College Geological Magazine—March 1934.

Journal of the Andhra Historical Research Society—October 1933 and January 1934.

Indian Journal of Economics—January and April 1934.

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The Himalayan Journal—Volume VI, 1934.

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